

The
United
States
of
America



The Commissioner of
Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

Bruce Lehman

Commissioner of Patents and Trademarks

Pandra J. Morth

Attest

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C ...). The first artifact folder for an artifact type receives the letter A, the second B, etc..

Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

09218335ZA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

☐

CD(s) containing:

computer program listing

Doc Code: Computer

pages of specification

and/or sequence listing

and/or table

Doc Code: Artifact

content unspecified or combined

Doc Code: Artifact

☐

Artifact Type Code: P

☐

Artifact Type Code: S

☐

Artifact Type Code: U

☐

Stapled Set(s) Color Documents or B/W Photographs

Doc Code: Artifact

Artifact Type Code: C

☐

Microfilm(s)

Doc Code: Artifact

Artifact Type Code: F

☐

Video tape(s)

Doc Code: Artifact

Artifact Type Code: V

☐

Model(s)

Doc Code: Artifact

Artifact Type Code: M

☐

Bound Document(s)

Doc Code: Artifact

Artifact Type Code: B

☐

Confidential Information Disclosure Statement or Other Documents marked Proprietary, Trade Secrets, Subject to Protective Order, Material Submitted under MPEP 724.02, etc.

Doc Code: Artifact

Artifact Type Code X

☐

1

Other, description: **FRPR**

Doc Code: Artifact

Artifact Type Code: Z



US005600445A

United States Patent [19]

Omi

[11] Patent Number: **5,600,445**
 [45] Date of Patent: **Feb. 4, 1997**

[54] **MODULAR COPYING SYSTEM USING
 LIGHT WAVE, ELECTRIC WAVE, OR SONIC
 WAVE INTERCONNECTIONS**

[75] Inventor: **Kyoji Omi, Kawasaki, Japan**

[73] Assignee: **Ricoh Company, Ltd., Tokyo, Japan**

[21] Appl. No.: **215,608**

[22] Filed: **Mar. 22, 1994**

[30] **Foreign Application Priority Data**

Mar. 23, 1993 [JP] Japan 5-089351

[51] Int. Cl.⁶ **H04N 1/00; H04N 1/40;
 G03G 21/00; G01D 15/00**

[52] U.S. Cl. **358/296; 358/401; 358/443;
 346/145; 399/1**

[58] Field of Search **358/296, 300,
 358/401, 442, 443, 468, 471, 474; 355/200,
 202; 347/3, 108, 138, 145, 152, 170, 222,
 245, 263; 346/145; 395/114**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,691,237	9/1987	Shimizu	358/443
4,962,430	10/1990	Hiroki et al.	358/296
5,001,574	3/1991	Shimizu et al.	358/448
5,087,932	2/1992	Chikane	346/145
5,180,232	1/1993	Chadima, Jr. et al.	346/145

FOREIGN PATENT DOCUMENTS

3337682	4/1984	Germany
3426313	1/1985	Germany
3522907	1/1987	Germany
3935713	5/1990	Germany

OTHER PUBLICATIONS

Siemens AG, Bestellnummer: A 19100-E686-A104-V1,
 1987, "Damit Meb—Und Prufgeschichten Kurzer Werden:
 Die Neunen PC-Mebgerate", 8 pages.

Primary Examiner—Peter S. Wong

Assistant Examiner—Eric Frahm

Attorney, Agent, or Firm—Oblon, Spivak, McClelland,
 Maier & Neustadt, P.C.

[57] ABSTRACT

A modular copying system including combinations of printer, scanner, and system controller modules formed as independent frames. The scanner module includes devices for image reading, first data I/O and first synchronizing signal generation; the printer module includes devices for image forming, second data I/O and second synchronizing signal generation; and the system control module includes devices for third data I/O and system control. The modules are added or removed according to user requirements and the system is capable of accommodating up to seven modules. The modules are stacked in a vertical direction and arranging devices ensure proper module alignment. Once the modules are aligned and assembled in the system, communications between each module is accomplished via light wave, electric wave, or sonic wave transmission and reception. As a result, system interconnection is reduced, system noise is reduced and various connecting cables are eliminated. In addition, the system can be connected to a public ISDN line for transmitting detected system faults to the factory and for receiving fault diagnosis information which is displayed to a user via a display. Further, the system is capable of performing various image processing functions, such as processing with a space filter, image size conversion, image-trimming, image movement, color image trimming, color correction, and tone conversion.

11 Claims, 25 Drawing Sheets

